2013 YEAR in REVIEW

NASA JPL GROUNDWATER CLEANUP

This 2013 Year in Review helps meet NASA's ongoing objective to keep the public informed about the progress of groundwater cleanup efforts at and in the vicinity of NASA's Jet Propulsion Laboratory (JPL).

"All Systems are Go!"

for NASA JPL Groundwater Cleanup

To borrow a phrase from the early years of space exploration, "All systems are go!" for NASA in its JPL groundwater cleanup project. As 2013 moved toward 2014, NASA continued to make significant progress in eliminating hundreds of pounds of unwanted groundwater chemicals, allowing local communities access to millions of gallons of clean drinking water.

Three NASA-funded treatment plants have been built, one on JPL property at what is considered the "Source Area" for the chemicals, another plant at the outer edges of the area affected by the chemicals, adjacent to two Lincoln Avenue Water Company (LAWC) water supply wells, and a third plant roughly at the center of the affected area, next to the City of Pasadena's Windsor Reservoir. The latter plant is owned and operated by Pasadena Water and Power (PWP), while LAWC owns and operates the NASA-funded plant at its supply wells.

All Three Systems Are Working Well

While NASA takes the lead for environmental investigations and cleanup activities associated with JPL, its work is closely overseen by Federal and California regulatory agencies, including the U.S. Environmental Protection Agency (EPA), the DTSC, and the Regional Water Quality Control Board (RWQCB), Los Angeles Region.

In 2013, according to NASA Groundwater Cleanup Project Manager Steve Slaten, "All three NASA-funded groundwater treatment systems continued to work in the way they were supposed to work – effectively removing the chemicals from groundwater." In mid-June, NASA submitted to the regulatory agencies a draft Focused Feasibility Study detailing its findings that the three treatment systems are effectively removing chemicals and should be utilized as the final remedy for groundwater. The feasibility study is required and will be among documents available for public review as the project moves toward what is called a "Final Remedy."

Source Area Treatment System

The on-JPL treatment plant began removing chemicals from groundwater in January 2005, removing perchlorate and VOCs from groundwater at a water treatment rate of about 150 gallons-per-minute (gpm). Two wells were originally being used to extract groundwater, and two wells re-injected clean, treated water into the aquifer hundreds of feet beneath the surface. NASA added a third extraction well and a third injection well in 2007, increasing the water treatment rate to about 300 gpm. Since system startup in 2004, NASA's Source Area Treatment System has reduced chemical concentration levels in groundwater beneath the plant by more than 90 percent, according to monitoring well data. From system startup to the end of 2013, some 1,774 pounds of perchlorate and 42 pounds of volatile organic compounds (VOCs) have been removed from groundwater beneath JPL.

Perchlorate is removed from source area groundwater using a fluidized bed reactor system with naturally occurring microorganisms that break down the chemical compound into harmless byproducts. VOCs in the source area groundwater are removed using a liquid-phase granular activated carbon (LGAC) system.

Groundwater Chemicals Being Addressed

The groundwater chemicals being addressed by NASA's cleanup are volatile organic compounds (VOCs) and perchlorate. These chemicals originated from long-discontinued liquid and solid waste disposal practices during the 1940s and 1950s when wastes from JPL drains and sinks were disposed of in brick-lined seepage pits – a waste management practice that was common at the time. Most of the VOCs that affected the nearby groundwater came from cleaning fluids and degreasers used on rocket engines being tested by the U.S. Army adjacent to the site more than a half-century ago. Perchlorate is both a naturally occurring and man-made chemical found in groundwater, surface water and soil. Perchlorate is a component of solid rocket propellants and is used in the manufacture of highway safety flares, fireworks, pyrotechnics, explosives, common batteries, and automobile restraint systems. Perchlorate contamination has been reported in 26 states, according to the U.S. Environmental Protection Agency (EPA).

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Monk Hill Treatment System (MHTS)

The MHTS, which began operations in early 2011, can treat groundwater at a rate as high as 7,000 gpm. By the end of 2013, 787 pounds of perchlorate and 73 pounds of VOCs had been removed from the groundwater by the MHTS. In conjunction with the construction of the system's groundwater treatment plant, NASA rehabilitated four Pasadena drinking water production wells -- the Arroyo Well, Well 52, the Ventura Well, and the Windsor Well. Those wells tap an aquifer beneath the Hahamongna Watershed Park in the Arroyo Seco, known as the Monk Hill Sub-basin of the larger Raymond Basin. The Raymond Basin lies beneath the northwestern portion of the San Gabriel Valley.

Perchlorate is removed at the MHTS using ion exchange technology, and -- similar to the Source Area Treatment System -- LGAC is used to remove VOCs in MHTS groundwater. Following the LGAC filter process, the water is pumped into the Windsor Reservoir, where it is then available for the City of Pasadena to use.

Lincoln Avenue Water Company (LAWC) System

The NASA-funded LAWC treatment system treats water pumped from two LAWC production wells at a rate of 2,000 gpm. A NASA-funded LGAC system has effectively removed VOCs from groundwater near the wells since the early 1990s. A NASA-funded addition to the plant has effectively removed perchlorate from the groundwater since July 2004, using ion exchange technology. In all, since system startup, 986 pounds of perchlorate and 216 pounds of VOCs have been removed from LAWC groundwater.

The LAWC serves customers in west Altadena and is the oldest local water company in the area. Its two drinking water production wells are at the leading edge of the area of groundwater chemicals that originated at JPL, according to data from an extensive NASA groundwater monitoring network. That network consists of 26 well sites, most with the ability to sample groundwater at different depths within the aquifer; it provides NASA with a total of 82 monitoring locations.

Protective of Human Health and the Environment

"While the existing offsite groundwater treatment systems at the Windsor Reservoir and at the LAWC wells continue to effectively remove chemicals from groundwater and be protective of human health and the environment, NASA continues to look for ways to enhance system performance," Project Manager Slaten said. "This past year, NASA took the initiative to conduct a detailed study of the existing JPL groundwater treatment systems to evaluate the potential for enhancements that could further improve system performance and reduce the time until cleanup goals are achieved. This study considered improvements to infrastructure and even installation of new wells."

NASA's number one goal, he stressed, is the complete cleanup of chemicals associated with historic practices at JPL. "We continued to make excellent progress in 2013 toward fulfilling our commitment to the cleanup. That progress and our commitment will continue into the future until our cleanup goal is met."

For information, contact

Merrilee Fellows
NASA Management Office/JPL 180-801
4800 Oak Grove Drive, Pasadena, California 91109
Phone (818) 393-0754
Email mfellows@nasa.gov
Web Site http://jplwater.nasa.gov

Para Más Información En Español, llame a Gabriel Romero
NASA JPL, Teléfono (818) 354-8709

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